

conventional radiography, can now almost routinely be seen in whole or in part. The evaluation of liver disease has been remarkably improved with better visualization of both primary and metastatic liver abnormalities as well as improved differentiation between surgical and medical jaundice.

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### Arteriographic Documentation of Coronary Arterial Spasm in Prinzmetal's Angina

PRINZMETAL'S VARIANT ANGINA is a syndrome characterized by angina occurring at rest in association with electrocardiographic ST segment elevation. While the presence of high grade lesions in the proximal portion of a major coronary artery can be shown in some patients with variant angina, the coronary arteries in others may be normal at the time of coronary arteriography. Moreover, infrequently the coronary arteriogram has been entirely normal in patients with previously documented myocardial infarction. Whereas spasm of the coronary artery has been theorized as the pathogenetic mechanism in these patients, isolated case reports in recent years have actually noted significant spasm of a major coronary artery in patients with Prinzmetal's angina.

Coronary arteriography in 17 consecutive patients with Prinzmetal angina at the University of California, San Diego, showed there to be high grade fixed obstructive lesions of the coronary arteries in nine patients and normal or insignificant lesions in the other eight patients. In three of the latter patients, there developed spontaneous spasm of the mid-right coronary (one patient), main circumflex coronary (one patient) or obtuse marginal branch artery (one patient)

during the arteriographic procedure. In each instance the spasm was sufficiently severe to produce total occlusion of the involved vessel. Angina and ST segment elevation appeared concomitant with the coronary arterial spasm. Coronary arterial spasm, angina and ST segment changes were abolished by sublingual nitroglycerin administration.

Provocative pharmacangiography, which consisted of the intravenous administration of ergonovine maleate, caused localized spasm of the right coronary artery in two other patients with Prinzmetal's angina. Again, angina and ST segment elevations occurred with the spasm and were instantaneously abolished by administration of nitroglycerin. Other investigators report a similar experience with the drug in this syndrome. Provocative pharmacangiography in ten patients with arteriographically normal coronary arteries and chest pain, which was not characteristic of Prinzmetal's angina, did not cause coronary arterial spasm.

Therefore, coronary arterial spasm is the responsible pathogenetic mechanism for myocardial ischemia in many patients with Prinzmetal's angina and this phenomenon can be shown during coronary arteriography.

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### Real Time Ultrasonography of the Abdomen and Pelvis

RECENT ADVANCES in technology now permit a diagnostician to examine the abdomen and pelvis in any patient and view a two-dimensional cross section in real time. In other words, there is simple instrumentation available that will allow a physician to observe a type of fluoroscopic tomogram, the location of which is easily selected by a hand-held array of transducers.

Vascular structures such as the abdominal aorta and the inferior vena cava are readily

visualized and may be observed during various physiological maneuvers. It has been our experience that disease entities such as right heart failure, tricuspid insufficiency and constrictive pericarditis produce a continuous dilatation of the inferior vena cava that does not vary with a phase of respiration. Differentiating between abdominal aortic aneurysms and periaortic masses is quite simple and requires less than five minutes.

Other vascular structures within the abdomen—such as the portal venous system, superior mesenteric artery, superior mesenteric vein and splenic artery—also seem to be reliably shown using the technique in more than 75 percent of the patients examined.

The noninvasive, nonionizing nature of the ultrasound technique has obvious applications in pregnancy. Not only can a diagnostician speedily determine the number and positions of fetuses present, but accurately describe and locate the placenta for possible amniocentesis. This diagnostic information obviates the need for ionizing radiation in the case of suspected multiple gestations, as well as a blind insertion of the amniocentesis needle. Locating the fetal head and determining the biparietal diameter requires only minutes. The ease of use of the real time scanning unit also overcomes the traditional problems previously encountered when a fetus changed the orientation of its head. The real time unit allows for rapid reorientation of the transducer array which facilitates gestational age estimation, regardless of fetal movements. Placental characteristics such as cystic spaces, thickness, location and pulsations are easily visible. It is also possible to observe distention of the fetal bladder with subsequent emptying, fetal heart structures and respiratory-like motions of the fetal thorax.

Many more applications of this new diagnostic modality are being made every day with obvious benefit to patients.

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## The Usefulness of Ultrasonography in Postoperative Patients

PATIENTS IN WHOM abdominal operations have recently been carried out are frequently difficult to examine both clinically and radiographically due to the presence of incisions, bandages and drains. Often the source of complications occurring in these patients, such as abscesses, is frustratingly elusive. Findings on routine abdominal radiographs including plain films, intravenous urograms and barium studies often are not conclusive until a mass is large enough to distort or displace an organ or until an extraluminal gas collection is noted.

B-mode ultrasound is frequently helpful in discovering the source of many postoperative complications. This technique visualizes the area of pathology directly instead of inferring its presence by noting abnormalities in adjacent structures. The examination is nontraumatic, and can be done at a patient's bedside if necessary. Wound contamination can be avoided if the examination is carefully and properly carried out.

Intraabdominal abscesses can be detected when they are larger than 3 cm. The appearance of an abscess is variable due to the presence of differing amounts of debris within them, but usually they are seen as irregular sonolucent areas. Special attention should be given to dependent regions such as the pelvis and subphrenic space, as well as those areas in the immediate vicinity of incisions and drains. The pelvic area should be scanned when the bladder is full to ensure deep penetration of sound. The subphrenic area can be particularly difficult to examine. When evaluating this area it has proved most advantageous to place the patient in a supine position and make the scans in a longitudinal fashion. Posterior longitudinal scans also should be done while the patient is sitting in an erect position (if possible). Decreased or absent diaphragmatic mobility also should be noted. Superficial wound abscesses are delineated by scanning the area circumscribing an incision. These abscesses frequently encompass much larger areas than are clinically appreciated.

In patients with suspected retroperitoneal postoperative complications, it is imperative that the scan be done from a posterior position in order to deliver enough sound to the area in question. If a patient cannot lie in a prone position, an adequate scan can nonetheless be obtained by